AQA – Algebra functions – AS Mathematics P1

1. June/2020/Paper_1/No.1

At the point (1, 0) on the curve $y = \ln x$, which statement below is correct?

Tick (✓) **one** box.

[1 mark]

- The gradient is negative and decreasing ☐
- The gradient is negative and increasing ☐
- The gradient is positive and decreasing ☐
- The gradient is positive and increasing ☐

2. June/2020/Paper_1/No.2

Given that $f(x) = 10$ when $x = 4$, which statement below must be correct?

Tick (✓) **one** box.

[1 mark]

- $f(2x) = 5$ when $x = 4$ ☐
- $f(2x) = 10$ when $x = 2$ ☐
- $f(2x) = 10$ when $x = 8$ ☐
- $f(2x) = 20$ when $x = 4$ ☐

3. June/2020/Paper_1/No.6

(a) It is given that

$$f(x) = x^3 - x^2 + x - 6$$

Use the factor theorem to show that $(x - 2)$ is a factor of $f(x)$.

[2 marks]

(b) Find the quadratic factor of $f(x)$.

[1 mark]

(c) Hence, show that there is only one real solution to $f(x) = 0$

[3 marks]

(d) Find the exact value of x that solves

$$e^{3x} - e^{2x} + e^{x} - 6 = 0$$

[3 marks]

4. June/2019/Paper_1/No.2

Dan believes that

for every positive integer n, at least one of $2^n - 1$ and $2^n + 1$ is prime.

Which value of n shown below is a counter example to Dan's belief?

Circle your answer.

[1 mark]

$n = 3$ $n = 4$ $n = 5$ $n = 6$

5. June/2019/Paper_1/No.3

It is given that $(x+1)$ and $(x-3)$ are two factors of $f(x)$, where

$$f(x) = px^3 - 3x^2 - 8x + q$$

(a) Find the values of p and q.

[3 marks

(b) Fully factorise $f(x)$.

[2 marks

6. June/2019/Paper_1/No.4

Show that $\frac{\sqrt{6}}{\sqrt{3}-\sqrt{2}}$ can be expressed in the form $m\sqrt{n}+n\sqrt{m}$, where m and n are integers.

Fully justify your answer.

[4 marks]

7. June/2019/Paper_1/No.5

(a) Sketch the curve $y = g(x)$ where

$$g(x) = (x + 2)(x - 1)^2$$

[3 marks]

(b) Hence, solve $g(x) \leq 0$

[2 marks]